

# PATENT SPECIFICATION

DRAWINGS ATTACHED

907,472



Date of Application and filing Complete Specification May 17, 1960.

No. 17434/60.

Complete Specification Published Oct. 3, 1962.

Index at acceptance:—Classes 4, B1; 52(2), J2(C6:CX); 52(3), O(17:18:22); and 103(2), C6.

International Classification:—B64c, A47b, c.

## COMPLETE SPECIFICATION

### Improvements relating to Seating for Vehicles, Rooms or similar use

- I, KARL DAVID KRYTER, a citizen of the United States of America, of 154, Hampshire Road, Wellesley, Massachusetts, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:
- 5      The present invention relates to an improved seating arrangement for multiple-seat vehicles or rooms. More particularly, the invention is concerned, among wider applications, with providing a seating arrangement adaptable for use in large passenger-carrying vehicles, especially airliners, which allows considerably more passenger comfort without any appreciable increase in the space requirements.
- 10     One of the most important considerations in the designing and building of modern passenger-carrying vehicles, especially those which travel long distances, is the comfort and convenience of the passengers. Long non-stop airline flights, such as trans-oceanic or cross-country, are apt to be tiring to the passengers because of the limited space which allows only restricted movement of most parts of the body.
- 15     The legs and feet are usually most adversely affected by the cramped position in which the passenger must remain during the trip. It is well known that when the level of the feet and legs is raised some-what above the floor and allowed to rest in this raised position, much of the discomfort caused by inactivity can be eliminated. How-ever, a difficulty is encountered in providing this added comfort because, ordinarily, more space would be required, thereby adding
- 20     to the operating expenses by reducing the
- 25     carrying capacity of the aircraft or vehicle. The present invention affords a novel and unique arrangement whereby the additional comfort and convenience are provided without uneconomically reducing the pay load of the carrier.
- 30     Moreover, the invention is advantageously applicable where seats such as are usual in aircraft have backs with angular adjustment so that more or less reclining of the occupant is catered for.
- 35     According to the invention there is pro-vided the combination of two or more seats so arranged that at least one is substantially behind another in staggered relation thereto, (that is to say, is spaced in the front-to-back sense and spaced laterally) in which a foot-rest aligned in front of one seat for the use of the occupant thereof has spaced above it an arm-rest for the occupant of the other seat (and, as will be apparent, such an arm-rest is available to the occupant of a seat adjacent to such other). This combination may be such that there is a plurality of seats spacedly arranged in banks of two or more, foot-rests (and corresponding arm-rests) intervening between adjacent seats in a bank.
- 40     A leg-rest being part of such combina-tion may be provided to extend if required between a seat and its corresponding foot-rest. The structure of foot and arm-rest may additionally support a movable shelf adapted for the use of the corresponding occupant; this supplies the usual need for a table-top for meals, etc. The invention also includes a structural assembly for such a combination of foot-rest, arm-rest, and leg-rest, adapted to slide for stowage into the space under the arm-rest.

45     carrying capacity of the aircraft or vehicle. The present invention affords a novel and unique arrangement whereby the additional comfort and convenience are provided without uneconomically reducing the pay load of the carrier.

50     Moreover, the invention is advantageously applicable where seats such as are usual in aircraft have backs with angular adjustment so that more or less reclining of the occupant is catered for.

55     According to the invention there is pro-vided the combination of two or more seats so arranged that at least one is substantially behind another in staggered relation thereto, (that is to say, is spaced in the front-to-back sense and spaced laterally) in which a foot-rest aligned in front of one seat for the use of the occupant thereof has spaced above it an arm-rest for the occupant of the other seat (and, as will be apparent, such an arm-rest is available to the occupant of a seat adjacent to such other). This combination may be such that there is a plurality of seats spacedly arranged in banks of two or more, foot-rests (and corresponding arm-rests) intervening between adjacent seats in a bank.

60     A leg-rest being part of such combina-tion may be provided to extend if required between a seat and its corresponding foot-rest. The structure of foot and arm-rest may additionally support a movable shelf adapted for the use of the corresponding occupant; this supplies the usual need for a table-top for meals, etc. The invention also includes a structural assembly for such a combination of foot-rest, arm-rest, and leg-rest, adapted to slide for stowage into the space under the arm-rest.

65     One of the subsidiary provisions of the

70

75

80

70

75

invention is the inclusion of a folding shelf attached to the foot and arm-rest structure and useful as a table for holding food and beverages and as a writing surface or platform for holding books and magazines. This shelf folds away from the passenger when not in use so as not to affect the accessibility of the seat to the passenger.

Where herein the term "seat" is used, it

5 is intended to refer to a structure like a chair having a sitting part and a back-rest part; the back-rest part may be adjustable as to angle as is usual in aircraft seating, to afford the occupant selection

10 of posture in the sense of more or less reclining. A "bank" of seats means two or more seats arranged side by side and substantially aligned laterally.

The foregoing and other aspects of the

15 invention and its practice will become more apparent after considering the following detailed description taken in conjunction with the annexed drawings wherein:—

Fig. 1 is a diagrammatic view of the seating arrangement installed in an aircraft, showing relative positions of the seat, leg rest and foot rest;

Fig. 2 is a general view of the seats and rests, showing a two abreast (i.e. two in a bank) arrangement which would be useful in a commercial airliner;

Fig. 3 is a diagrammatic view of the seating arrangement as applied for use in two specific types of commercial aircraft presently being used in passenger-carrying service; and

Fig. 4 is a side elevation of a single seat, leg rest, and foot rest showing the folding shelf attached to the foot rest structure in both the open and closed positions.

Referring now to Fig. 1, there is shown a general view of seating arrangement looking downward from above. Items 13, 14, 45 15 and 16 represent the seat portion and items 13 $\alpha$ , 14 $\alpha$ , 15 $\alpha$  and 16 $\alpha$  represent the back of each of the respective seats. Seats 15 and 16, for example, form a "bank" as do 13, 14. It will be seen that the seats of one bank are staggered in relation to another.

The seats have corresponding foot rests numbered 17, 18, 19 and 20. Each of the foot rests includes an open end portion to allow the passenger occupying the seat directly behind the foot rest to insert his feet therein. In practice, an occupant of seat 13 utilises the foot rest 17, the occupant of seat 14 uses the foot rest 18 and other passengers use the other foot rests. It will be noted that these foot rests are located between each of the seats. For example, foot rest 18 is located between seats 15 and 16. By locating foot rest 18 in this manner, it also serves as an arm rest for

the occupants of seats 15 and 16. On the other side of seat 15, positioned between the airplane fuselage 21 and the seat, there is located the foot rest 17 used by the occupant of seat 13. This foot rest 17, also serves as an arm rest for the occupant of seat 15. Items 23 and 25 serve as arm rests for passengers in seats 14 and 16 respectively.

Between each of the seats and its corresponding foot rest are located the leg rests 27, 29, 31 and 33. These leg rests serve to support the legs of the occupant of the seat. When stowed out of use, each of the leg rests may be slid into or just above or below its corresponding foot rest, thus leaving the floor space between the seats free of obstruction.

A general view of the seating arrangement looking from the outside of the airplane toward the centre aisle is shown in Fig. 2. It will be noted that the foot rests 17, 18, 19 and 20 have folded shelves 17 $\alpha$ , 18 $\alpha$ , 19 $\alpha$  and 20 $\alpha$  supported by the foot-rest or arm-rest structure. When unfolded, these shelves serve as tables for food and beverages or may be useful as writing surfaces. Any convenient means may be employed to fold and unfold the shelves and to hold them in the locked position after unfolding. The position of the shelf 17 $\alpha$  in unfolded position is shown by dotted lines in Fig. 4.

The seating arrangement as described herein is particularly adaptable for use in a commercial airliner. In Fig. 3 there are compositely shown applications of the invention in two different types of aircraft. In a wider type airplane having three in a bank seating on one side of the aisle and two seat banks on the other side, such as the DC-7, the seating arrangement would appear as shown in the left side of Fig. 3. A narrower type of airliner which has banks of two seats on each side of the aisle, is depicted in the right portion of Fig. 3. It will be noted that the seats are staggered in the sense that the front edges form an angle of less than 90° with the side of the airplane thereby incidentally allowing the passenger to see out the side windows more easily and comfortably.

It will be understood that the invention has been described with reference to a particular application, that is, for use in commercial airliners. By various changes and modifications, the invention would be useful in other applications without departing from the scope of the invention.

#### WHAT I CLAIM IS:—

1. The combination of two or more seats so arranged that at least one is substantially behind another in staggered relation thereto, in which a foot-rest aligned in front of one seat for the use of the occupant thereof,

has spaced above it an arm-rest for the occupant of the other seat.

2. A combination as claimed in Claim 1 in which there is a plurality of seats spacedly arranged in banks of two or more, foot-rests (and corresponding arm-rests) intervening between adjacent seats in a bank.

3. A combination as claimed in Claim 1 or 2, in which additionally a leg-rest is provided to extend, if required, between a seat and its corresponding foot-rest.

4. A combination as claimed in any preceding claim, in which a foot and arm-rest structure supports a movable shelf adapted for the use of the seat occupant aligned with it.

5. A combination according to any preceding claim, in which a foot-rest and arm-rest form respectively the bottom and top of an enclosure with an opening for the feet of the user of the foot-rest.

6. In a combination according to Claim 1 or 3, a structure comprising a foot-rest, an arm-rest spaced above the foot-rest, and a leg-rest adapted to slide for storage into the space below the arm-rest.

7. The combination as claimed in any previous claim wherein passenger-carrying seats are placed at an acute angle to the side wall of a vehicle, said angle being so chosen that the occupants of said seats can

more readily see out of windows placed in the side of the vehicle.

8. In a combination of seats for passenger-carrying vehicles, a first seat, second and third seats in a bank located forwardly of said first seat, partially enclosed foot-rests disposed beside said second and third seats and aligned with said first seat for supporting the feet of the occupant thereof, and a leg-rest placed between said first seat and its corresponding foot-rest to support the legs of the occupant of said first seat, said leg-rest being adapted to be moved under an arm-rest to permit ready access to said first seat, such arm-rest being positioned for the occupancy of said second and third seats.

9. The improved combination of seats and seating arrangements for multiple-seat vehicles or rooms substantially as described with reference to Figures 1 and 2; or to Fig. 3 of the accompanying drawings.

10. The improved combination of seats and leg-rest substantially as described with reference to Fig. 4 of the accompanying drawings.

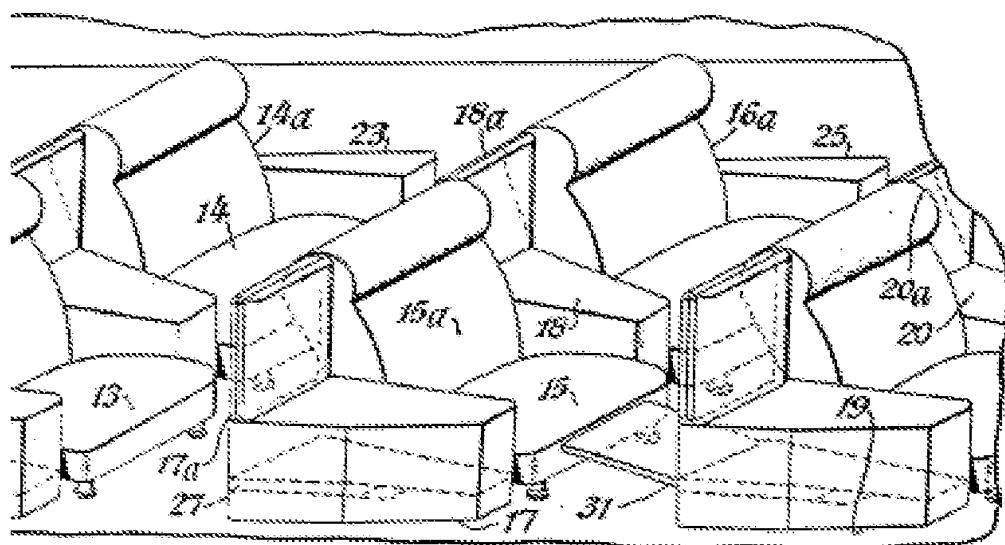
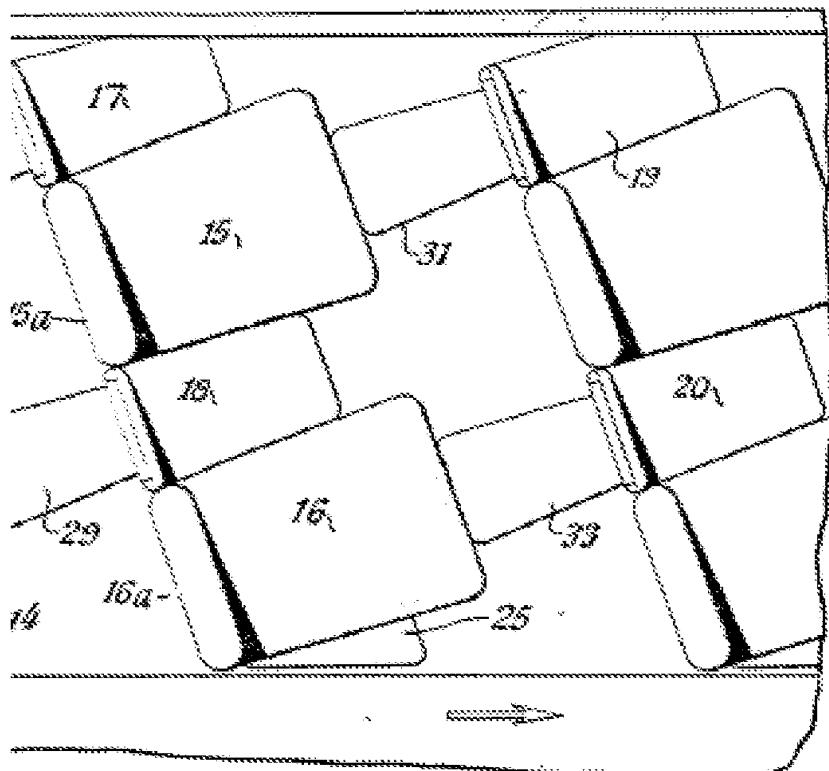
FREDERICK J. CLEVELAND,  
Agent for the Applicant,  
Chartered Patent Agent,  
302-306, Bank Chambers,  
329, High Holborn,  
London, W.C.1.

937473

## **COMPLETE SPECIFICATION**

卷之三

This drawing is a reproduction of  
the Original on a reduced scale  
Sheet A



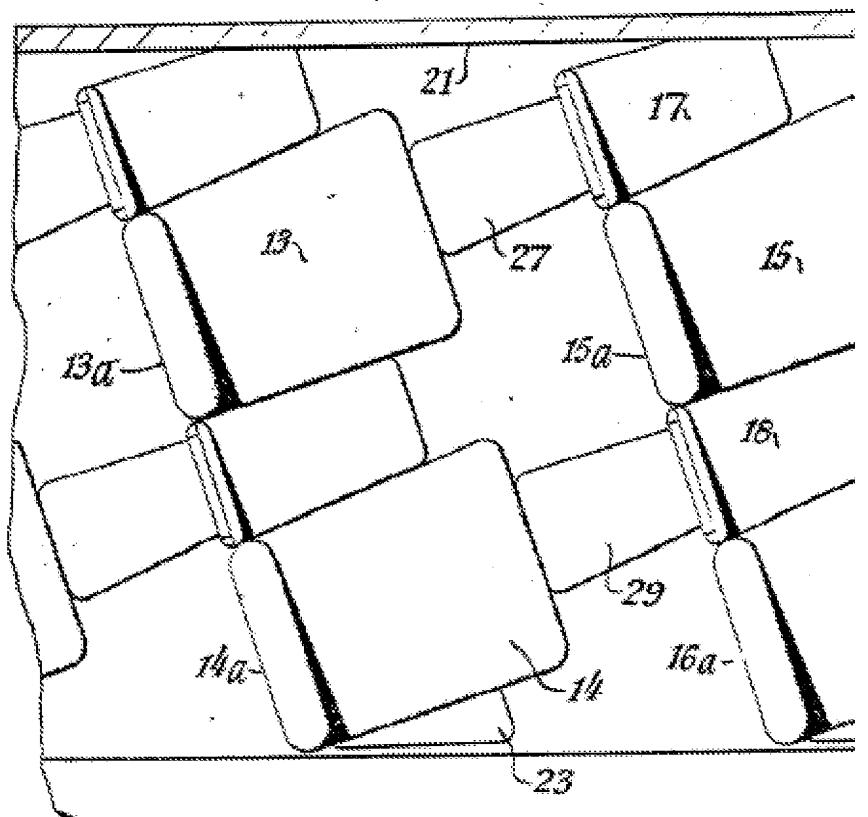


Fig.1

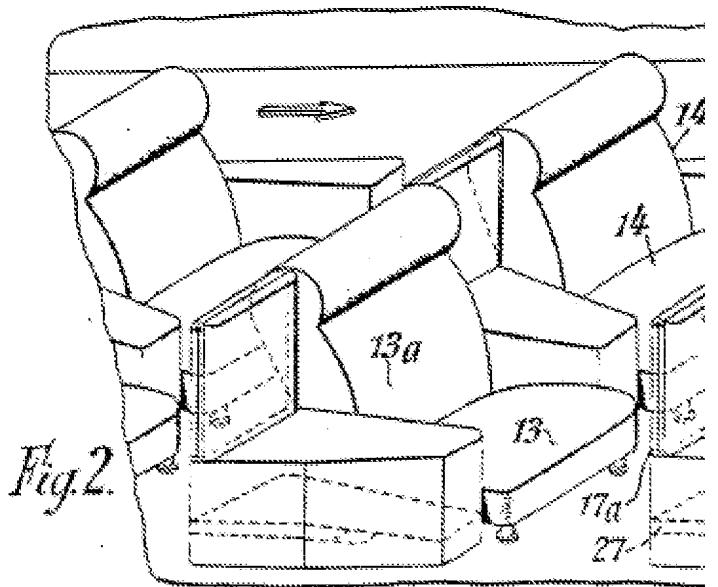


Fig.2

907472 COMPLETE SPECIFICATION  
2 SHEETS This drawing is a reproduction of  
the Original on a reduced scale  
Sheet 1

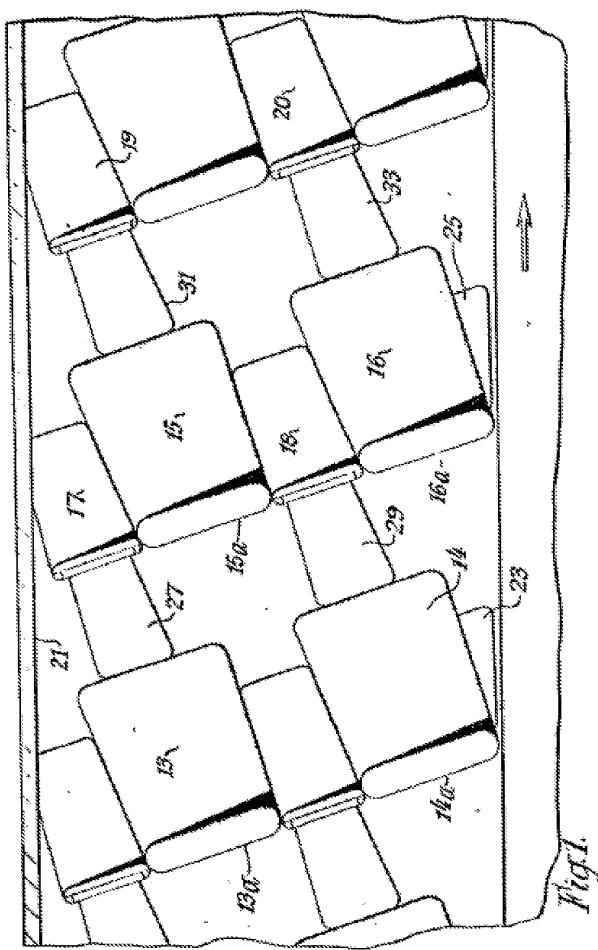


Fig. 1

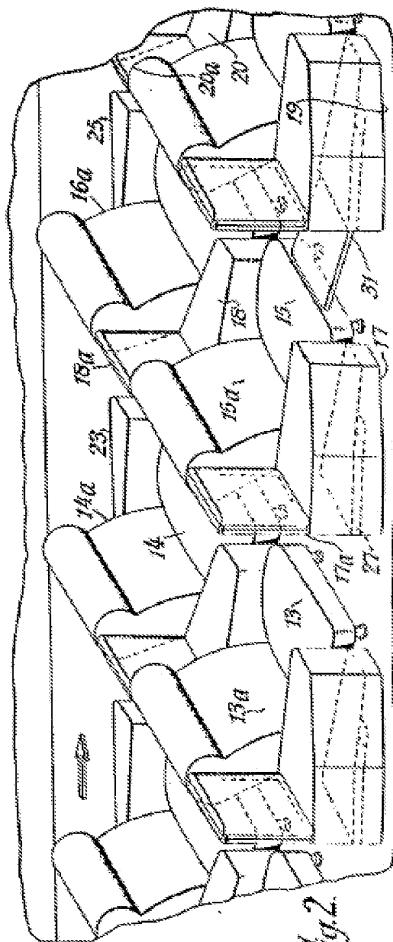


Fig. 2

907472

COMPLETE SPECIFICATION

2 SHEETS

*This drawing is a reproduction of  
the Original on a reduced scale  
Sheet 2*

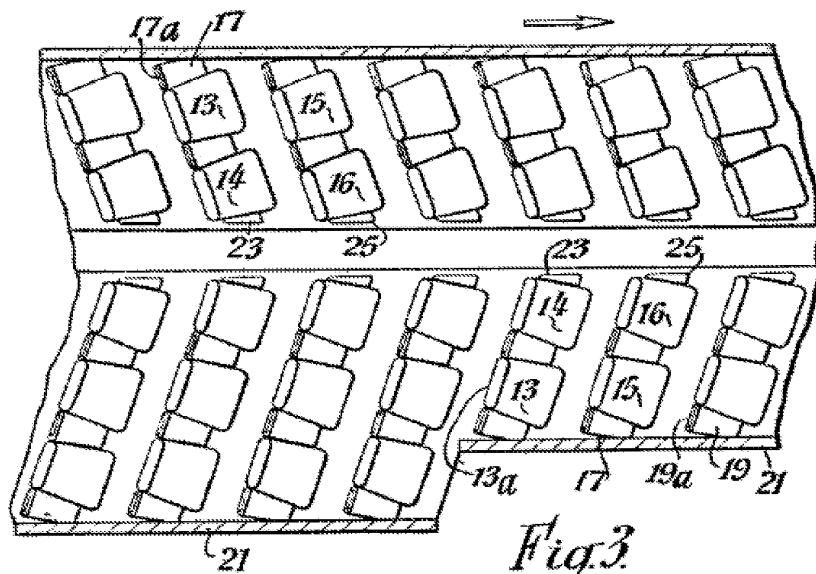


Fig.3

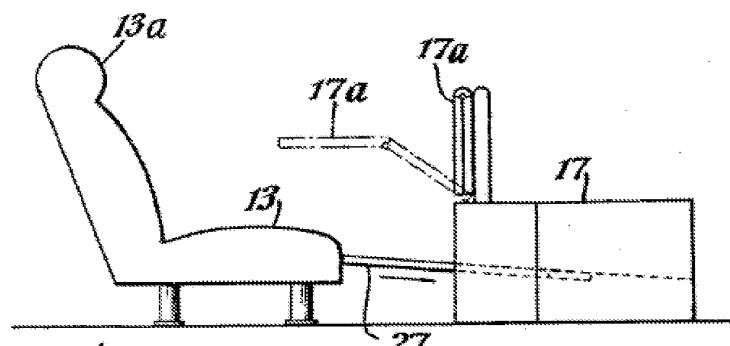


Fig.4.